

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

THE ASTEROID GENUS CORONASTER.*

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The genus *Coronaster* Perrier, currently classified in the Pedicellasteridæ, should include also *Asterius* (*Stolasterius*) *volsellata* Sladen, which Professor Verrill recently made the type of *Heterasterias*,† of the family Asteriidae.

Coronaster, as usually understood, includes the following nominal species: *C. parviti* Perrier, the type, from the Cape Verde Islands; *C. antonii* Perrier, founded upon a very immature specimen from Morocco; *C. briareus* (Verrill), from south of Key West, and also northward between N. lat. 37° 18' 11" and 36° 41' 05"; *C. bispinosus* Ives, locality unknown, perhaps identical with *briareus*; *C. octoradiatus* (Studer), from South Georgia Island.

Verrill‡ has given the most recent diagnosis of *Coronaster*: "Delicate starfishes with a small disk and numerous slender rays, covered with long, slender spines in radial rows. The dorsal skeleton is weak, made up of the rows of median and superomarginal plates, connected together by slender transverse ossicles. Each plate of the longitudinal rows usually bears one slender spine. Both rows of marginal plates well developed and spiniferous. No interactinal [actinal intermediate] plates. Adambulacrals diplacanthid. Large, felipedal [unguiculate], dermal major pedicellariæ occur above and below. Minor

* Published with permission of the Commissioner of Fisheries.

† Monograph of the Shallow-water Starfishes of the North Pacific Coast, etc., 1914, p. 46.

‡ Report on the Starfishes of the West Indies, Florida, and Brazil, Bull. Univ. Iowa, Vol. 7, No. 1, Mch. 20, 1915, p. 31.

pedicellariæ form large circumspinal wreaths, borne on contractile sheaths. Tube-feet are relatively large, in two rows, not crowded. A pair of large peroral spines on the margins of the oblong jaws, with groups of oral marginal pedicellariæ.''

I have examined a specimen of *Coronaster briareus* from 90 fathoms, Gulf Stream, south of Key West. In this specimen R equals 81 mm., or slightly more than in the largest example listed by Professor Verrill (1915, p. 31). In this specimen the tube-feet are crowded and quadriserial, or arranged in what one might prefer to call two crowded zig-zag series, inasmuch as the pores remain biserial. On the outer two-fifths of one ray the pedicels are biserial, while on the other four, the quadriserial arrangement extends to the tip. Perrier* mentions that in *C. antonii* the tube-feet are quadriserial on part of the ray, although the specimen is very small.

I have compared this specimen of *C. briareus* side by side with large and medium-sized examples of *Heterasterias volsellata* (Sladen) from the Philippine Islands, which has similarly arranged quadriserial tube-feet, with biserial pores, only slightly zig-zag in very large specimens. Furthermore the highly characteristic skeleton of *volsellata* is nearly exactly duplicated, with minor specific differences, by that of *briareus*. This skeleton, which holds good also for *C. parfaiti* and *C. antonii* as figured by Perrier,* consists of slender, lobed plates, joined by more or less elongate connecting ossicles in such a way as to form a median radial, and two marginal, regular longitudinal series, joined together at the intervals of the primary plates by transverse ossicles, leaving four series of large, rectangular papular areas. At each node of this skeletal mesh is a sharp spine with a retractile wreath of abundant pedicellariæ. The inferomarginal plates abut tightly against the adambulacrals. Furthermore, both species have the curious hand-shaped, unguiculate major pedicellariæ of conspicuous size, figured by Professor Verrill.†

Perrier‡ has given carefully drawn figures of *C. parfaiti* and *C. antonii*. As already noted the skeleton is essentially the

* Expéd. scientif. du Travailleur et du Talisman, Échinodermes, 1894, p. 96, pl. 8.

† Verrill, 1915, op. cit., pl. 9, fig. 4c.

‡ Perrier, 1894, op. cit., pl. 8.

same as that of *briareus* and of *volsellatus*. It seems reasonable, on account of the small size of Perrier's specimens, to consider them immature. They match very well the immature, regenerating rays of *volsellatus*, which also have the pedicels biserially arranged, and at a certain stage biserial at the base and tip and quadriserial in the middle portion.

Coronaster volsellatus has one adambulacral spine, the other species generally two. In *C. parfaiti* there are three spines on the first five plates, and two on the others. *C. antonii* has the spines "solitary on the majority of the plates, but in pairs on certain others among them." I do not think the monacanthid condition of *volsellatus* of sufficient importance to cause a generic separation. The new species, *Coronaster halicepus*, is diplacanthid and is evidently a close relative of *volsellatus*.

Coronaster is therefore represented in the East Indies by two species, and in the Atlantic by five nominal forms.

The family affiliations of *Coronaster* are not easy to determine, its lineage being somewhat involved. The tendency to crowding in the arrangement of pedicels partakes of the Asteriidae, while its mouth plates are quite as "brisingoid" as those of *Odinia*, and perhaps more so than the oral angles of *Labidiaster*, two groups placed in the Brisingidae. Its skeleton is more like that of a simplified *Pedicellaster* than like that of *Asterias*, or allies. Parenthetically, the mouth plates of *Pedicellaster* are more prominently "adambulacral" than those of any genus of the Asteriidae, even of *Coscinasterias*, and are nearly or quite as prominent, relatively, as the oral angles in *Brisinga*. In *Pedicellaster* and *Coronaster* the ambulacral plates are more "brisingoid," uncrowded, and the pedicel pores are in two series, even if later the feet themselves lie in four ranks. In very large specimens of *Coronaster*, the pedicel pores form two slightly zig-zag rows, much less pronounced than in small specimens of *Coscinasterias* (in the broader sense), and the ambulacralia are less crowded. My own feeling is that until we arrive at a more satisfactory basis for the subdivision of the Asteriidae than is now current, it will be much better to leave *Coronaster* in the Pedicellasteridae, rather than to relegate it to the Asteriidae, even though one of its species has long occupied an undisputed corner in that over-burdened family.

GENUS CORONASTER PERRIER.

Coronaster PERRIER, Ann. sci. nat., art. 8, 1885, p. 13. Type, *C. parfaiti* Perrier; Expèd. sci. du Travailleur et du Talisman, Échinodermes, 1894, p. 92, pl. 8.

Stolasterias (subgen.) *pars* SLADEN, *Challenger* Asteroidea, 1889, p. 584. *Heterasterias* VERRILL., Shallow-water Starfishes of the North Pacific Coast, etc., 1914, p. 46. Type, *Asterias (Stolasterias) volsellata* Sladen.

Coronaster halicepus new species.

Characters.—In general appearance very closely resembling *C. volsellatus*, but differing in having 10 rays, 2 adambulacral spines, relatively broader and shorter major, unguiculate pedicellariæ, with longer claws, heavier ambulacral forcifiform pedicellariæ with the jaws conspicuously crossed at tips, and longer forcipiform minor pedicellariæ, each jaw with upward of 12 or even more small teeth in addition to the large terminal teeth (5 or 6 in *volsellatus*). $R=260$ mm., $r=17$ mm., $R=15\pm r$; breadth of ray at base, 11 mm.; at 25 mm. from base, 14 or 15 mm.

Type.—Cat. No. 37,012, U. S. Nat. Mus.

Type-locality.—Albatross station 5281, between Lubang and Luzon, Philippine Islands, 201 fathoms, dark gray sand, bottom temperature, 50.4° Fahr. Taken also off the Molucca Passage, Molucca Islands, 298 fathoms.

The adambulacral spines form the most trenchant character to separate this species from *volsellatus*. They are 2, slender, slightly tapered, blunt, situated on the furrow margin in an oblique series, the inner being aboral to the outer and about two-thirds to three-fourths as long; the latter is one-half to three-fifths as long as the inferomarginal spine. About every other plate has on the furrow face 1 or 2 forcifiform pedicellariæ about 1 to 1.25 mm. long. These extend between the tube-feet, and are at the end of a thick, apparently highly extensible stalk, around the base of which are 1 to several very small pedicellariæ. These pedicellariæ have the ends of the jaws crossed and are broader than in *volsellatus*, where the jaw tips fit together snugly. The trabecule of the abactinal and lateral skeleton, and the papular areas, have numerous large six-clawed unguiculate, hand-shaped, pedicellariæ, about 1.5 mm. long. These resemble two miniature hands clasped, with the fingers bent, and are shorter and broader than in *volsellatus*, as well as much more numerous.